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10/767,658	01/29/2004	Masaki Okamoto	36409	5389

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PEARNE & GORDON LLP
1801 EAST 9TH STREET
SUITE 1200
CLEVELAND, OH 44114-3108

EXAMINER	
PATEL, SHAMBHAVI K	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/767,658	OKAMOTO ET AL.	
	Examiner	Art Unit	
	SHAMBHAVI PATEL	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 May 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A **request for continued examination** under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 29 May 2008 has been entered.

2. Claims 1-19 have been presented for examination.

Response to Arguments

3. In response to Applicant's amendments, the 35 U.S.C. 101 rejection and the objection to the specification is withdrawn.

4. Applicant's arguments filed 29 May 2008 regarding the prior art rejection have been fully considered but they are not persuasive.

Regarding the prior art rejection:

i. **Applicant submits,** on pages 11-12 of the amendment, that Sarvar does not disclose simulation of successive steps of the mounting process.

The Examiner appreciates Applicants attempts to clarify the claimed invention. However, Examiner notes that the limitation "different steps in the plurality of steps composing the mounting process" is broad. Sarvar discloses simulating the reflow soldering process, which has multiple sub-steps (i.e. calculation of heat capacity, simulation of the oven, simulation of the peak temperature). Therefore, these sub-steps are all interpreted to be different steps within the mounting simulation.

ii. **Applicant submits**, on pages 12-13 of the remarks, Sarvar does not disclose the claimed limitations because Sarvar et al. teaches simulating peak temperature based on specific heat data which is empirically derived, and that as per Examiner's own admission, Sarvar's values are empirically derived.

Examiner notes that per the Applicant's own admission, a simulation step may comprise "…executing an interpolation calculation using the analysis result data" **(see page 4 of the specification).** While Sarvar discloses empirical data, the interpolation of this data is used in the simulation **(section IV.C).** Sarvar discloses the **calculation** of heat capacity values based on empirical results and the **interpolation** of these results to calculate the varying heat capacity values that are used for the next simulation **(Sarvar: section**

IV.B and IV.C). Thus, the calculation of the heat capacity values is a simulation and the resulting calculated heat capacity values are simulated conditions and the rejection is maintained.

Examiner notes that the calculations and interpretations of Sarvar are interpreted to be analogous to the simulation in the claims. Assuming, for the sake of argument, that the simulation recited in the claims differs from the teachings of the prior art, for which the Examiner disagrees, the specification of the instant application appears to show a similar methodology. For example, **pages 9-10** of the specification indicate that the condition data may be experimental data:

> and stored in a resultant data storing portion 16, and experimental data ED collected by executing experimentally the simulated steps by an experimenting equipment 14 respectively and stored in an experimental data storing portion 17. The CAE

After this condition data is stored, the simulation proceeds **(page 18):**

> Then, the sample calculating portion 24 of the CPU 2 executes the simulation operation by using the result table stored in the result table storing portion 61 and the condition table stored in the condition table storing portion 62, and then outputs such calculated result as the calculated result data (step S7). The sample calculating portion 24 samples the result data corresponding to the process condition data and recited in the result table as the calculated result data, based on the process condition data set forth in the condition table. If no consistent data is found, the data in vicinity of the result data given in the result table are calculated as the calculated result data by executing the interpolation calculation, or the like. An example in which the sample calculating portion 24 calculates the calculated result data by executing the interpolation calculation will be described hereunder.

Thus, as per the specification, interpolation of experimental data and process condition data is considered to be a simulation step. The empirical data of Sarvar is analogous to the experimental data in the specification.

iii. **Applicant submits,** on page 13 of the remarks, "For similar reasons as discussed above, Sarver et al. fails to teach or suggest executing a simulation of the second step based on a second condition, wherein the

second condition comprises the simulation condition at least a third condition in order to yield a second simulation result, as recited in the rejected claims."

Examiner notes that as shown above, the heat capacity values are simulated conditions, and thus Sarvar discloses this limitation.

iv. **Applicant submits,** on page 14 of the remarks, that Sarvar does not disclose the limitation "…from the condition table and a condition input from the inputting portion" because "Sarvar et al. related to empirically deriving varying specific heat capacity values and then simulating a peak temperature."

Examiner notes that the specific heat data is not empirically derived; rather, it is calculated from empirically derived data, and is a simulated condition. When performing the simulation, the user inputs conditions such as which library of component models are to be referenced, which material properties are to be associated with which geometric features of the PCA, etc. **(Sarvar: section V.A).** The rejection is maintained.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-19 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by **Sarvar et al. ('Effective Modeling of the Reflow Soldering Process: Basis, Construction, and Operation of a Process Model'),** herein referred to as Sarvar**.**

Regarding claims 1 and 14:

Sarvar discloses a mounting process simulation program of causing a computer to execute a simulation of a mounting process composed of a plurality of steps, and a method of executing a simulation, comprising:

a. a first simulation executing step of executing a simulation **(IV.B: specific heat capacity calculated (i.e. simulated))** based on a first condition selected for a first step **(IV.B: heat flow)**.

b. a simulation condition deciding step of selecting a simulated result from the first simulation executing step as a simulation condition for a second step positioned subsequent to the first step **(Table III; 'Modeling of an Exemplar Product and Process Combination').** The specific heat capacity is varied, and this value is used to calculate the peak temperatures.

c. a second simulation executing step of executing a simulation-of the second step based on a second condition containing at least the simulation condition **(section V.B)** and a third condition **(section V.A: user inputs process conditions)** that yields a second simulation result that is displayed **(Table III),** wherein the first simulation executing step and the second simulation executing step are directed to different steps in the plurality of steps composing the mounting process **(section V.B: multiple steps are simulated, such as the simulation of the variable heat capacity values, simulation of the peak temperature, simulation of the oven, etc).**

Regarding claim 2:

Sarvar discloses simulating a typical reflow profile **(page 128 'Radiative Heating').** The temperature is varied with time *(conditions)*, and this data is used to calculate the output. Therefore, the output *(analysis data)* is calculated during *each* temperature variation. The Examiner interprets 'analysis result data' to be data produced in the first simulation step that is then analyzed and/or sampled in the second simulation step, and 'wherein analysis result data simulated previously based on a plurality of conditions are generated every step' to mean that this data is produced at every step.

Regarding claim 3:

Sarvar discloses varying the specific heat capacity to record the temperature changes **(page 131 'Modeling Variable Materials Data' paragraphs 1-3).** The variable behavior of the specific heat capacity is represented in the models using *interpolation tables for each variable material.* **Sarvar discloses** simulating a typical reflow profile **(page 128 'Radiative Heating').** The temperature is varied with time *(conditions)*, and this data is used to calculate the output. Therefore, the output *(analysis data)* is calculated during *each* temperature variation. The Examiner interprets 'analysis result data' to be any data produced in the first simulation step that is

then analyzed and/or sampled in the second simulation step, and 'wherein analysis result data simulated previously based on a plurality of conditions are generated every step' to mean that this data is produced at every step.

Regarding claim 4:

Sarvar discloses deriving the specific heat capacity by using the heat flow from samples analyzed with a calibrated Mettler TA3000 differential scanning calorimeter **(page 129 'Specific Heat Capacity Values' paragraph 1).** This is analogous to the outside device in the claim language. The derived value is then converted to a computed-readable value and used in the simulation **(page 132 'Modeling of an Exemplar Product and Process Combination' paragraph 1). Sarvar discloses** simulating a typical reflow profile **(page 128 'Radiative Heating').** The temperature is varied with time *(conditions)*, and this data is used to calculate the output. Therefore, the output *(analysis data)* is calculated during *each* temperature variation. The Examiner interprets 'analysis result data' to be any data produced in the first simulation step that is then analyzed and/or sampled in the second simulation step.

Regarding claim 5:

Sarvar discloses the simulation program of claim 4 wherein the experimental data simulated at every step via a CAE tool is selected as the analysis result data **(page 127 'Outline of System Components' 2nd paragraph; page 129 'Specific Heat Capacity Values' paragraph 1),** wherein the type of data selected as the analysis result data is converted to a common format **(figure 1 post processing and data presentation).** The specific heat capacity is experimentally derived and is then used in the simulation as the analysis result data to calculate its effect on the temperature variation **(page 132 'Modeling of an Exemplar Product and Process Combination' paragraph 1).**

Regarding claims 6 and 19:

Sarvar discloses a mounting process simulation program according to claim 1, further causing the computer to execute an animation displaying step of displaying three-dimensionally an animation to indicate a result simulated in the second simulation executing step on a display device, by reading previously- stored animation elements based on a definition file in which an operation sequence is defined every step **(figure 8; page 132 'Modeling of an Exemplar Product and Process Combination' paragraph 1).**

Regarding claim 7:

Sarvar discloses a mounting process simulation program according to claim 1, wherein the second simulation executing step includes a condition acquiring step of reading a condition selected in response to an input from a condition database in which a plurality of conditions are stored previously in combination, and adding the condition to the second condition **(page 131 'Modeling Variable Materials Data' paragraph 3)**. The specific heat capacity is modeled using tables.

Regarding claim 8:

Sarvar discloses a mounting process simulation program according to claim 7, wherein the condition acquiring step further reads data from a CAD system in response to the input and adds the data to the second condition **(figure 1).**

Regarding claim 9:

Sarvar discloses a mounting process simulation program according to claim 1, wherein the first simulation executing step executes the simulation to contain production variation in the first step **(Table III: production variation specific heat capacity)**, the simulation condition deciding step decides the result simulated in the first simulation executing step to contain the production variation as the simulation condition and the second simulation executing step executes the simulation of the second step based on the second condition to contain the production variation **(Table III: simulation to determine variation in temperature due to variation in specific heat capacity).**

Regarding claim 10:

Sarvar discloses a mounting process simulation program according to claim 1, wherein the first simulation executing step executes the simulation based on a change of a control item set in the first step as the first condition **(IV.B first condition is heat flow)**, the simulation condition deciding step decides the result simulated based on the change of the control item in the first simulation executing step as the simulation condition **(IV.B first simulation**

calculated specific heat capacities), and the second simulation executing step executes the simulation of the second step based on the second condition to contain the result simulated based on at least the change of the control item **(Table III: simulation to determine variation in temperature due to variation in specific heat capacity).**

Regarding claim 11:

Sarvar discloses a mounting process simulation program according to claim 1, further causing the computer to execute a reliability evaluating step of executing a reliability evaluation of a product manufactured in the mounting process by using the result simulated in the second simulation executing step **(figure 6).**

Regarding claim 12:

Sarvar discloses a mounting process simulation program according to claim 1, further causing the computer to execute a fraction defective calculating step of calculating a fraction defective of a product manufactured in the first step and the second step, by using results simulated in the first simulation executing step and the second simulation executing step **(Introduction: paragraphs 2 and 3).**

Regarding claim 13:

Sarvar discloses a mounting process simulation system provided to steps of a mounting process composed of a plurality of steps to execute a simulation of the mounting process, comprising:

a. an inputting portion for inputting a plurality of conditions to execute the simulation **(figure 1; IV.B; table III: heat flow, specific heat capacity)**
b. an executing portion for executing the simulation based on the condition input from the inputting portion **(figure 1)**
c. an outputting portion for outputting a result of the simulation executed by the executing portion **(figure 1)**
d. wherein the executing portion includes:
    i. a condition table forming portion that forms a condition table of a second step positioned subsequently to a first step, whereby the condition table is formed by

using a simulation result simulated based on a first condition selected for at least a first step, of a second step positioned subsequently to a first step **(IV.B: first condition is heat flow and first simulated result is specific heat capacities)** The specific heat capacities is modeled using an *interpolation table.* The first step is varying the heat capacity, and the second step is measuring the temperature.

ii. simulation result outputting portion executes the simulation of the second step based on the condition data from the condition table and a condition input from the inputting portion **(section V.A: user inputs process conditions)** and outputs a result to the outputting portion **(page 131 'Modeling Variable Materials Data' paragraphs 1-3).** The variation of the temperature is calculated based on this first condition.

Regarding claims 15 and 17:

Sarvar discloses selecting the first, second, and third condition from a plurality of conditions **(section IV.B; table III).** The plurality of conditions include the specific heat capacities, the heat flow, and the material properties.

Regarding claims 16 and 18:

Sarvar discloses the program of claim 15 wherein the plurality of conditions include part conditions **(section IV.B heat flow).**

Conclusion

6. **Examiner's Remarks:** Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shambhavi Patel whose telephone number is (571) 272-5877. The examiner can normally be reached on Monday-Friday, 8:00 am – 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571) 272-2279. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SKP

/Kamini S Shah/

Supervisory Patent Examiner, Art Unit 2128